The Open University

MU120
Open Mathematics

Course Guide

Contents

1 Welcome to MU120 Open Mathematics

This course is designed to open up the power and beauty of mathematics to a wide variety of people and to enable you to share the enjoyment and stimulation of studying mathematics and using it in different aspects of life. We, the course team, hope your studies will be interesting, enlightening, satisfying and successful. Welcome to the course.

Read through this booklet *before* you begin to study MU120. If you are new to studying with the OU, please read the 'Welcome to the OU' booklet alongside this guide. It aims to give you the information you need at the start of the course, to help you to organize the course material and to give you an overview of the course components, including the assessment.

Some of the information contained in this booklet is useful reference material for you to use throughout the year.

2 Aims and outcomes of MU120

MU120 *Open Mathematics* is a distance-learning course: you can study it on your own, wherever and whenever is appropriate for you—you do not need to attend an educational institution.

A general course aim is to enable you to build your confidence in learning and using mathematics in a wide variety of contexts, so that you become a 'literate mathematician'. This means being able to understand and interpret material with a mathematical flavour in newspaper and magazine articles, television programmes and other media, and also being able to explain mathematical concepts and their use to other people (often in writing). The course also aims to help you to acquire various mathematical skills and to become a proficient user of a powerful mathematical calculator, so that you can benefit from using this tool in your everyday life as well as in your studies.

The following list of outcomes indicates what you should be able to do by the end of the course.

Knowledge and understanding

- ◇ Understand some of the key basic mathematical and statistical ideas and principles in the areas of:
  - numbers and formulas;
  - graphs and diagrams;
  - functions and symbols;
  - handling data and modelling.
- ◇ Understand and use basic vocabulary, notation, representations and conventions associated with elementary statistics, algebra, trigonometry, functions and graphs.

Cognitive skills

- ◇ Appreciate how mathematics pervades aspects of everyday life.
- ◇ Use techniques from the course to analyse and solve problems in a range of contexts.
- ◇ Recognize, interpret and criticize the use of mathematics in different contexts.
- ◇ Reason logically using the mathematical and statistical ideas and principles introduced in the course.

Key transferable skills

- ◇ Organize study time and exploit feedback, to study independently.
- ◇ Communicate clearly and coherently, using appropriate structure, style and technical language.
- ◇ Prepare and review a timetable for specific tasks, using relevant information and prioritizing work to meet agreed deadlines.
- ◇ Reflect on your own progress in the course, showing an understanding of learning how to learn.
- ◇ Review progress made in specific aspects of work and be aware of the factors contributing to development.

Practical and/or professional skills

- ◇ Be aware of the demands of university-level study in mathematics (especially if this is the first university course taken).
- ◇ Use a graphics calculator for a variety of mathematical/practical purposes.

These different skills are developed through a variety of learning materials, designed for independent study: written study texts, video, audio, the *Calculator Book* and a variety of assignments. If you can attend tutorial sessions, you will also have the valuable opportunity to expand and develop your ideas with other students and your tutor.

3 Course mailings

This booklet was sent to you as part of the first course mailing. There will be further mailings of materials during the course. Sort through each mailing soon after it arrives, identifying and organizing the different items. If anything is incorrect, you can then get replacement items ahead of schedule, rather than discover that you have an incorrect, damaged or missing item when you need it for your studies. For example, if you have been sent the wrong audio CD, get a replacement well before you need it.

Particularly important items are the 'Contents Checklist' and 'Stop Press'.

Contents Checklist

This lists all the items in the mailing and gives a contact if anything is missing. It is useful to check off items as you unpack them.

Stop Press

The Stop Press contains important information, including errors which have slipped through the proof-reading process, so make sure that you look at it as soon as possible. Please notify us of any further errors you find: corrections will be added for the future.

Other items in the mailings

The first mailing package

Course Guide
Study Calendar
Unit 0 Preparing for Open Mathematics
Diagnostic Quiz
Diagnostic Quiz Solutions
Preparatory Resource Books A and *B*
Calculator Book Chapter 1
Preparatory Readings
Activity sheets (cream and blue)
Assignment Booklet I
Audio-CD 1

Later mailings

Units 1 to *16*
Calculator Book
Readings
Other audio-CDs and DVDs
Resource Books A to *D*
Activity sheets (cream and blue)
Other Assignment Booklets

4 Course components

The various components that make up the course are outlined below.

Preparatory work

You should start work on the preparatory materials in this mailing as soon as possible. *Unit 0 Preparing for Open Mathematics* guides you through the materials, helping you to decide upon the preparation you need to do. You should aim to work through the necessary parts of this material before you are due to study *Unit 1*.

The preparatory material assumes only familiarity with everyday mathematics and not any experience of using distance-learning materials. It covers basic mathematical and calculator skills, and skills needed for effective distance learning.

There is a computer-marked assignment (CMA) and a tutor-marked assignment (TMA) question associated with the preparatory work. The CMA (but not the TMA) is purely formative—that is, it does not count towards your final course score. However, you are strongly recommended to complete it, in order to practise doing mathematics, completing assignments and using feedback.

Study Calendar

This gives the start dates for each study unit, cut-off dates for assignments, details of the video and audio components associated with each unit. You may find it useful to refer to the Study Calendar and add in other dates, as you plan and schedule your work. Try to keep it in an accessible place—for example, on a noticeboard.

Course units

The core of every course unit is the main study text—this refers you to other components: audio, video, reader articles, the *Calculator Book* and activity sheets. Each component is identified by an icon in the unit text. The units include activities, to help keep your learning 'active'. This is one of the best ways of learning. Some activities have comments at the back of the text, to give you feedback. At the end of each unit there is a list of the learning outcomes (ideas that you should understand and skills you should have acquired) and an index. Most units are scheduled to be studied over a fortnight. The units are arranged in blocks.

The icons usually appear at the beginning of the relevant sections, as well as at the point where you need the resource.

Introduction

Unit 0	Preparing for Open Mathematics	
Unit 1	Mathematics everywhere	
Block A	*For better, for worse*	
Unit 2	Prices	
Unit 3	Earnings	Block A has a statistical emphasis.
Unit 4	Health	
Unit 5	Seabirds	
Block B	*Every picture tells a story*	
Unit 6	Maps	
Unit 7	Graphs	Block B has a graphical and algebraic
Unit 8	Symbols	emphasis.
Unit 9	Music	
Block C	*The ever-changing world*	
Unit 10	Prediction	
Unit 11	Movement	Block C emphasizes mathematical
Unit 12	Growth and decay	functions and modelling data.
Unit 13	Baker's dozen	
Block D	*Sight and sound*	
Unit 14	Space and shape	Block D emphasizes geometry,
Unit 15	Repeating patterns	trigonometry and consolidation.
Unit 16	Rainbow's end	

The calculatcr and the Calculator Book

You will need to acquire a particular model of calculator for this course, referred to as the course calculator. You will need to use it when studying **every unit**, so plan to have it with you whenever you are studying MU120. Initially, you are only expected to be able to use it for arithmetic, but you will be introduced to different aspects of the calculator gradually throughout the course. By the end of the course, you should be confident in using many of the calculator's powerful facilities.

The first Stop Press gives details of how to obtain it.

The book *Tapping into Mathematics* is referred to as the *Calculator Book*. Each chapter normally corresponds to a course unit. The book has an index so that you can subsequently check up on calculator procedures.

The calculator book icon

Optional activities in the *Calculator Book* are called 'Brain stretchers'—and are designed to do just that! If you are interested and have *additional time*, have a go at some of them, to extend your calculator work. No solutions or comments are provided for the Brain stretchers.

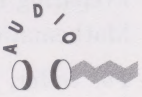
Readings

An important aim of the course is for you to be confident in communicating mathematics—this involves reading a variety of mathematical materials, producing written material and discussing mathematical ideas. To help you to acquire these important skills, some units include work associated with articles from the *Readings Booklet* (sometimes referred to as the *Reader*).

The readings icon

Audio

Some units have an audio CD component, which enables you to listen to discussions of mathematical ideas or the strategy behind calculations and problem-solving. Any section that uses audio has the audio icon at the beginning, so you can get your playing facilities ready for your study of that section.



The audio icon

Many of the audio sequences are 'interactive', in that you work through specially designed diagrams called *frames* as you listen to the audio, pausing when appropriate. You will need writing materials for making notes or working on specific problems. You can study at your own pace, pausing and repeating the audio as often as you wish. The audio material was originally produced on audio tape, rather than CD. So please interpret any references to "tapes" as applying to the CDs.

Video

As with the audio, you will be directed to particular DVD video bands from the unit text. Like audio, video material provides you with different ways of learning. Video also provides you with a variety of contexts in which to explore mathematical ideas. You may be directed to stop the video at specific points and do some work on your own. However, you may also wish to pause at other points to review or replay sections.

The video icon

Please interpret any references to video tapes as referring to the DVDs.

Television programmes: Seeing through Mathematics

A series of television programmes was made to accompany the suite of mathematics entry courses: MU120, MST121 and MS221. They are provided on separate DVDs and are generally intended to be enrichment material. All of the programmes are designed to be of interest to a general audience, so you might like to watch them with friends or family. Some of the programmes are closely linked to MU120 (and are mentioned in the units), while others link to mathematical contexts not introduced in MU120. (These are not referred to in MU120 and you may not be able to follow all the detail.) All of the programmes address topics where mathematics is an important aspect. For example, programmes explore the design of fun-fair rides; the way that hunting affects whale populations; how Florence Nightingale used statistics to support her ideas on health-care improvements; the analysis of military conflict; and the formation of a rainbow.

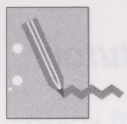
Resource Books

The Preparatory Resources Books are an integral part of your study of Unit 0. However, subsequent *Resource Books* contain activities for extra practice on each unit and consolidating ideas. Some of these are particularly suitable for working on with other students: for example, at tutorials or in self-help study groups. These are optional, but are worthwhile if you are finding some concepts difficult.

The resource book icon

Activity sheets and your learning file

MU120 *Open Mathematics* aims to help you to think about and improve your own learning skills and strategies, so that you can study this course successfully and learn effectively in the future. Throughout the course, there are activities designed to help you to develop and practise your skills and understanding. Some activities have associated activity sheets, which you may find useful. Whether or not you choose to use these sheets, you will need to keep a record of your learning on the course. This record of your work is sometimes referred to as your learning file. Many students use an A4 ring file to keep their written work together, while some use computer files. Many include other notes and assessment work. Wherever you decide to keep your returned assignments, keep them safely for reference, and for doing consolidation questions in later assignments.



The activity sheet icon

The learning file icon

Assignment Booklets

The *Assignment Booklets* contain the tutor-marked assignments (TMAs) and the computer-marked assignments (CMAs). On the front page of each booklet is a table listing the cut-off dates for the assignments. The cut-off dates are also given in the Study Calendar. So plan your work to meet these deadlines.

The assignment book icon

Tutorial sessions

In many places, face-to-face tutorials are scheduled. These are optional, but many students find them enjoyable and helpful. On average, the students who take advantage of these sessions perform better on the course than those who do not. So do try to participate if at all possible. Tutorials provide the opportunity to meet and get to know your tutor and other students doing the course. The sessions may take a variety of different forms, including working in groups and getting help from your tutor on particular problems or queries concerning the course. In some places there may be telephone or electronic tuition rather than face-to-face meetings, depending upon the geographical distribution of the students.

Tutorial sessions can be a tremendous help in clarifying mathematics and boosting confidence. They can enable you to review and consolidate your own learning, improve your mathematical and calculator skills, and help resolve difficulties. For example, you may discover that others are having problems with the same concept or technique which can be overcome by talking and working on activities together. Discussing ideas is often beneficial in learning mathematics. Initial discussion of assignment questions with other students and your tutor is often valuable, but do remember that you must complete the actual assignment independently.

Some students also find that tutorials help them to maintain their progress. Some use the meeting to form self-help study groups, which meet informally by mutual arrangement.

5 Your tutor

As an MU120 student, you will be allocated an Associate Lecturer as your tutor, to help you with your study of the course. You should regard your tutor as an academic friend: somebody who is there to help you and provide feedback on your work. Before the course starts, you should receive your tutor's contact details from your OU Regional Centre. They are also on your student homepage at www.open.ac.uk/student.

Although some students may not be able to meet their tutors face to face, there is one form of tuition that all students can expect from their tutor. This is via teaching comments on their assignments, called 'correspondence tuition'.

Correspondence tuition

Correspondence tuition is a very important element in this and other Open University courses. Doing an assignment should help you to review and consolidate your learning. However, the feedback on it should further help your learning. On each of the TMAs you submit, your tutor will spend a lot of time writing individual comments that are designed to help you personally. This is the one time when you are guaranteed personal one-to-one tuition. Make the most of it. Comments may point out where you have done well, as well as misconceptions or errors in a technique. Your tutor may give advice on how to overcome problems and answer queries you have indicated in your TMA (for example, if you do not understand something). Although you may receive the comments a couple of weeks after you submitted the TMA, it is worth taking the trouble to go through the assignment again carefully, considering each comment and planning how and when to act upon it. Many comments will help you with future work as well as helping you consolidate your past work.

The TMAs should enable you to maintain a dialogue with your tutor about your progress on the course. You write to your tutor in the assignment and he or she writes back to you with feedback on your progress, teaching comments and advice.

6 Assessment

The assessment strategy has been designed to help you in your learning. Assessment not only provides an external check on your progress, but also allows you to monitor your own progress. It is a good idea to build it into your work schedule and use it constructively from the beginning. Try to make the work for your assignments an integral part of your learning—get involved in using and practising what you have studied.

The assessment components consist of tutor-marked assignments (TMAs) and computer-marked assignments (CMAs). Both should help consolidate your learning and maintain your study schedule.

Students' strategies for tackling assignments vary considerably, and you need to develop one that suits you. Many students tackle the relevant assignment questions at the end of each unit and then come back to them again before finalizing the assignment. Others work on the questions alongside their study of each unit, go over them again at the end of a unit and go over them once more before submission. *Include the assignments as part of your study of each unit. Do not leave tackling them until the last minute.*

An important aspect of the assessment is the feedback you receive—comments from your tutor on the TMAs and answers and comments for the CMA questions. Feedback is an important part of the learning process—so try to use it routinely and constructively to identify any areas on which you need to do further work.

You are advised to keep copies of all the assignments you send and, if possible, to obtain certificates of posting, just in case of loss in the post.

Tutor-marked assignments (TMAs)

There are four assessed (or summative) TMAs that contribute to your final grade. Each TMA consists of a number of questions. The first three TMAs have four questions on individual units and one other question. Most of the unit based questions will require you to demonstrate mathematical and/or calculator skills and some may require communication skills, for example in interpreting your answer or explaining an idea. The one other question on each TMA requires you to plan or consolidate your work and monitor your progress. The final TMA is a consolidation assignment covering the whole course. Keep your returned assignments as you will need to refer to them in later assignments.

Computer-marked assignments (CMAs)

CMAs are made up of multiple-choice questions, which are marked by computer. Apart from the non-assessed (or formative) preparatory CMA, there are four assessed (summative) CMAs in the MU120 course. Most CMAs contain five or six questions on each of five units.

The last CMA, however, covers the whole course.

Summary of the MU120 assessment strategy

Assignment	Units assessed, including *Calculator Book* work	Weight of component
CMA MU120 41	*Unit 0* (Preparatory material)	0%
CMA MU120 42	*Units 1* to *5*	7%
CMA MU120 43	*Units 6* to *10*	7%
CMA MU120 44	*Units 11* to *15*	7%
CMA MU120 45	Whole course	14%
TMA MU120 01	*Units 0* to *3*	13%
TMA MU120 02	*Units 4* to *8*	13%
TMA MU120 03	*Units 9* to *12*	13%
TMA MU120 04	Whole course	26%

The final assignments TMA04 and CMA45 cover the whole course and feedback on them may be delayed until after the results of all students have been determined.

Cut-off dates

Every assignment has a cut-off date, which is the date by which your assignment should reach its destination: TMAs should be sent to your tutor and CMAs to the Open University (in the envelope provided).

There are *no extensions to CMA cut-off dates.* If there are serious extenuating circumstances that prevent you from completing any CMAs on time, you can notify the University of your special circumstances, so that these can be taken into consideration. (You will receive details of how to do this later in the year.)

If extenuating circumstances prevent you completing a TMA by the cut-off date, your tutor may sometimes be able to give you a short extension. You must contact your tutor *before the cut-off date* to discuss any problems you may have in meeting deadlines.

However, your tutor cannot give extensions for TMA04. For serious problems, contact a *study adviser at your regional centre before the cut-off date.*

7 What you have to do to pass the course

To pass MU120, you need to achieve two things. Firstly, to have performed satisfactorily in the assessment component as a whole. This usually means achieving an overall average of at least 40%. Secondly, to have achieved at least 20% on TMA04. Your overall mark will be computed in line with the procedure outlined in the *Assessment Handbook.*

If, for whatever reason, you miss an assignment or only achieve a low mark, your grade may be improved by a mechanism called 'substitution', outlined in the *Assessment Handbook*. It means that your grade for one of TMAs 01, 02 or 03 and one of CMAs 42, 43 or 44 can be substituted by your overall course grade (computed from the whole assessment). It is advantageous to do all the assignments (not least because you receive feedback), but it is not disastrous if you are not able to do yourself justice on a particular assignment. Note, however, that there is no substitution for TMA04 and CMA45.

8 Organizing your study

One of the skills that you need to be successful in your study of MU120 is the ability to organize yourself. All Open University students have to do this, so MU120 tries to help you to develop this skill. Some activity sheets are designed to help you to plan and monitor your work. Try to work out your own best learning strategy, by using a variety of study patterns early on. Later units assume that you have become an efficient learner.

Study time

Although talking to other people about your studies is likely to help you, you will also need to spend quite a lot of time studying on your own: thinking, watching and listening, as well as reading and writing.

The time that each student takes to study the course varies according to the individual. On average students need to set aside about *eight hours per week*. However, the time required can vary significantly from person to person. Some people work faster than others and some people have met some of the ideas before. So try to allow more study time for topics which are new to you.

Planning your study

Each study unit is structured in a similar way, starting with a study guide, to help you plan and organize your work. There is a diagram which indicates the way sections are linked, the materials needed for each section and the approximate study time. A horizontal bar represents roughly an hour of study for an average student.

As part of your study of a unit, remember to allow enough time to complete the associated chapter of the *Calculator Book*, watch video, listen to audio, complete activities and attempt the assignment questions related to the unit.

What you need to hand when studying

When you are studying the MU120 course texts, you will need to be learning actively—that is, doing the activities and making notes on the important ideas. You will always need writing materials and your course calculator handy. In some sections of a unit, you may also require other resources—such as the *Calculator Book*, the *Readings*, activity sheets, video or audio—as indicated by the appropriate icons. The study guide diagram at the beginning of every unit indicates those sections that require additional resources, so you can plan your study of the unit accordingly. Before starting the course, consider the equipment you will need to use. Try to get everything ready before you begin to study. Here is a list of the equipment you will need in addition to the course materials.

Equipment needed	**Approximate frequency of use**
DVD player and monitor	Once per unit (for about an hour)
Audio CD player	Once or twice per unit (for about an hour)
Writing equipment	Every unit
Graph paper	Many units
Protractor and ruler	Some units, especially *Units 6* and *14*
Course calculator	Every unit
Learning file	Every unit

9 Where to get help

From your MU120 tutor

Your tutor is there to help you in your learning on the course, to mark your TMAs and to give you support and advice on any problems that arise from your Open University studies. If you are concerned or worried about any aspect of your MU120 work, contact your tutor first to discuss possible courses of action. Do remember, it is always preferable to talk with someone at an early stage, when it is likely that a difficulty can be resolved. Tutors generally make themselves available for you to telephone or e-mail for help or advice.

From other students

Talking to other students is often helpful in learning mathematics. You may see some of them at tutorials, if you are able to attend, but that still leaves many weeks in between. You might like to form your own study group and make contact during the weeks when there is no tutorial. Students generally find such meetings extremely beneficial. It is sometimes helpful to discuss assessment questions informally, before tackling them yourself. If you would like to join a self-help group or just chat to other students on the phone, get in touch with your tutor, who may be able to help put you in touch with like-minded students.

From an online course forum

The Open University Students Association (OUSA) provides an online course forum for MU120. So, if you have easy access to a computer with an internet connection, you may discuss your studies with other students (often from all over the world). You should receive details of your OU computer user ID and password, together with information on how to access the OU's online resources.

From your Regional Centre

If there are any academic queries that your tutor cannot settle for you, he or she may advise you to contact one of the Mathematics and Computing Faculty staff tutors in your Regional Centre, responsible for the organization of the MU120 tuition in the region.

If you have any non-academic problems in connection with your studies, consult the student support services in your Regional Centre.

Using the tutorial telephone service

There is a telephone tutorial service run by members of the Mathematics and Computing Faculty, who endeavour to answer e-mail and/or telephone queries when you cannot reach your own tutor. Details are given in the first Stop Press.

If you cannot contact anybody directly, then you may leave a message about course-related queries with a 24-hour telephone answering service in the Faculty at Walton Hall, on the number given in the Stop Press. Listen to the recorded instructions and leave your message. Someone listens to messages at least once per working day. Replies to urgent problems may be via telephone, but less urgent replies may be in writing.

From student organizations

Many Open University mathematics students belong to a nationwide telephone help service called MOUTHS, which is associated with a student-run mathematics association and magazine called M500. Details appear in the first Stop Press.

From yourself

As well as these other sources of help, you can help yourself by starting the course units on time or even ahead of schedule, so that, if anything unforeseen occurs that inhibits your studying, you will be in a good position to catch up again afterwards.

So it is now time to get started! Very best wishes for your study of MU120 *Open Mathematics*. The members of the course team hope you find it interesting, stimulating and enjoyable.

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